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ABSTRACT

Theorists have hypothesized that alcoholism, antisocial behavior, and childhood hyperactivity are part of a spectrum of disorders that have a common etiologic component, i.e., neuropsychological deficits to the structures (limbic system, frontal lobes) which regulate impulses. To examine the similarities in neuropsychological deficits between alcoholics and antisocial psychiatric patients, 31 alcoholic inpatients completed a battery of neuropsychological tests consisting of the Wisconsin Card Sorting Test, a sequential matching memory task, and the Necker Cube. Data from a group of 43 psychiatric patients, and from 18 college student controls, who were subjects from a previous study, were included. The psychiatric patients were divided into an antisocial group, and a non-antisocial control group. Comparisons of the pattern of cognitive-perceptual performance of the four groups showed that the alcoholics and the antisocial group differed significantly from the non-antisocial control group and from the college students, but did not differ significantly from one another. When separated by age, the younger alcoholics differed significantly from the non-antisocial control group and from the college students, but did not differ from the antisocial group or from the older alcoholics. The findings suggest that antisocial psychiatric patients and alcoholics are characterized by similar frontal lobe deficits. The fact that older and younger alcoholics had the same degree of deficit on the measures used suggests that the deficits may be antecedent. (BL)

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Presented at the 92nd Annual Convention of the American Psychological
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Parallels in Cognitive-Perceptual Deficit between Alcoholics
and Antisocial Psychiatric Patients

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One of the features of alcoholism that distinguishes it from most other psychiatric disorders is that, in theory at least, it can coexist with virtually any other psychiatric condition. In practice, however, it appears that certain behavioral or psychological phenomena are much more strongly associated with alcohol abuse than are others. In particular, several studies suggest that "disinhibitory" behavior phenomena - such as antisocial behavior or childhood hyperactivity - constitute a significant risk factor for alcoholism, especially when combined with a family history of alcohol use; moreover, such disinhibitory phenomena seem to be evident in the histories or current psychological profiles of a large proportion of individuals who are already alcoholic (see Lewis, 1984 for a review).

Findings such as these have led a few theorists (e.g., Gorenstein & Newman, 1980; Tarter, 1976) to hypothesize that alcoholism, antisocial behavior, and childhood hyperactivity are part of a spectrum of disorders that have a common etiologic component. As to what this etiologic component might be we can only speculate, but one line of conjecture has focused on neuropsychological deficits of the kind that follow damage to the limbic system and frontal lobes (Gorenstein & Newman, 1980). These are structures that seem to play a preeminent role in the regulation of impulses (Pribram, 1973).

A few studies have, in fact, produced support for the frontal deficit hypothesis as it relates to antisocial behavior (e.g.,

Gorenstein, 1982; Lidberg, Levander, Schalling, & Lidberg, 1978; Pontius & Ruttiger, 1976). In one of these, I (Gorenstein, 1982) found that antisocial psychiatric patients differed from psychiatric controls in their performance on three neuropsychological tasks. The pattern of deficit observed was analogous to that reported in the literature for patients having frontal lobe lesions.

These findings provide some initial support for the notion that frontal-type deficits characterize one disinhibitory syndrome. But confirmation of the more general notion that such deficits are the etiologic link among several syndromes requires that the findings be extended. In particular, it must be shown that the pattern of neuropsychological deficit observed among antisocial psychiatric patients is present in the other hypothesized spectrum disorders.

Neuropsychological deficits in alcoholics are of special interest in this regard because they have already been investigated quite widely in another context, specifically, to determine the nature and extent of the presumed organic effects of alcohol consumption. However, consistent with the etiologic model just discussed, recent studies (Elmasian et al., 1982; Goodwin, 1983) have presented evidence that at least some portion of the neuropsychological deficit in alcoholics may have existed prior to the onset of alcohol abuse itself.

A question of some theoretical interest, then, is how similar are alcoholics and antisocial psychiatric patients in their pattern of neuropsychological deficit?

Based on the etiologic model discussed, one would predict rather strong similarities on tasks relating to frontal processes.

Accordingly, it was hypothesized that alcoholics would exhibit a pattern of cognitive-perceptual deficit comparable to that observed among antisocial psychiatric patients in a previous study. Also, consistent with the etiologic model, it was predicted that the pattern of deficit would not be restricted to older alcoholics, as has generally been the case in neuropsychological studies (Goldman, 1983), but would be present in younger alcoholics as well.

METHOD

Subjects.

Subjects for the study were 31 inpatients in the New York VA Medical Center's alcoholism rehabilitation program. These subjects were tested at a minimum of 5 weeks following cessation of drinking, the mean for the group being 8.0 (SD = 2.22) weeks.

Included in the study for comparison purposes were the data from a group of 43 psychiatric patients who were subjects in a previous study (Gorenstein, 1982). These patients had been divided into two groups, (1) an antisocial or "psychopathic" group and (2) a nonantisocial control group, based on behavioral and psychometric criteria (Gorenstein, 1982). For present purposes, the data from 5 of these subjects, who were themselves alcoholism rehabilitation patients (2 from the antisocial group and 3 from the control group), were combined with that of the current alcoholic sample. The purpose of this was to isolate all the known alcoholics in a single group.

In addition to the clinical groups, a sample of 18 college students had been included in the previous study and their data are

also reported here.

Characteristics of the different groups of subjects are shown in Table 1. There are four groups: 18 in an "antisocial/psychopathic" group, 20 in a group labelled "psychiatric controls", 18 in the college student group, and 36 in the alcoholic group. As can be seen in the table, there is a significant age difference between the alcoholic sample and the other two clinical groups. Whereas the antisocial and psychiatric control groups have a mean age of approximately 27, the alcoholic sample has a mean age of approximately 45. The effect of this difference will be considered in detail later. Other variables in the table relate to socialization: (a) Research Diagnostic Criteria (RDC) for antisocial personality disorder (APD), and (b) scores on the Socialization scale of the California Psychological Inventory. These are the measures that were used to divide subjects into antisocial (psychopathic) and control groups in the previous study (Gorenstein, 1982). Alcoholics generally seem to fall somewhat between the antisocial and the control group in their socialization levels.

Procedure.

The battery of neuropsychological tests administered to the alcoholics included the three principal measures that distinguished the antisocial from the psychiatric control group in the previous study.

The first of these was the Wisconsin Card Sorting Test. The subject's task is to match a given card to one of the four stimulus cards on the basis of the principle inferred from the examiner's

response of "right" or "wrong". On the first set, the examiner initially reinforces only color matches; then, after criterion is reached the examiner shifts principles without warning, reinforcing matches made only on the basis of form, and subsequently, those made only on the basis of number.

The principal measure of interest is the number of perseverative errors committed by the subject; these are errors that represent persistence with a previously correct, but currently incorrect, response set. In the previous study, the antisocial group had been differentiated from psychiatric controls by a significantly greater number of perseverative errors. Analogous results have been reported by other investigators with long-term alcoholics (Jenkins & Parsons, 1980; Tarter, 1973) and with patients having frontal lobe lesions (Drewe, 1974; Milner, 1963; Robinson et al., 1980).

The second task of interest is the sequential matching memory task. In this task the subject is shown a series of cards bearing either a plus or a minus sign. The subject's task is to recall the sign that appeared two cards prior to the one currently being shown, that is, indicating which sign appeared on the first card when shown card #3 and so on.

In the previous study, the antisocial group was differentiated from psychiatric controls by a significantly greater number of errors on this task. One study in the neuropsychological literature suggests an analogous tendency on the part of frontal lesion patients (Lezak, 1983).

The third task of interest utilizes the Necker Cube. This is a simple perceptual task in which the subject reports the number of

reversals in perspective that are perceived during a 90 second viewing interval. In the previous study, the antisocial group reported a significantly greater number of reversals than psychiatric controls. An analogous tendency was reported by Teuber (1964) in patients with bilateral frontal lobe lesions.

RESULTS

Comparison of the four groups of subjects with respect to their pattern of cognitive-perceptual performance was accomplished by discriminant function analysis. The 3 discriminator variables were: (1) perseverative errors on the Wisconsin Card Sorting Test, (2) total errors on the sequential matching memory task, and (3) total reported Necker Cube reversals.

The results of the analysis are depicted graphically in Figure 1. Overall, the difference among groups is significant at $p < .001$ (Wilks' Lambda = .688; Approximate $F(9, 207) = 3.814$). F-tests (computed from the Mahalanobis distance) between pairs of groups indicate that the alcoholics - group 4 - differ significantly from both the psychiatric controls - group 2 - ($F(3, 85) = 4.08, p < .025$) and the college students - group 3 - ($F(3, 85) = 4.88, p < .01$). A similar result holds for the antisocial group - group 1 - ($F(3, 85) = 7.64, p < .001$; and $F(3, 85) = 8.35, p < .001$, for the difference with psychiatric controls and college students respectively). Yet, the antisocial and the alcoholic groups do not differ significantly from one another ($F(3, 85) = 1.35$), nor do the college student and the psychiatric control group ($F(3, 85) = .32$).

Correlations between the first canonical variable, which

accounted for 98% of the total dispersion, and each of the discriminator variables were computed. The correlations were .74 for Wisconsin Card Sorting Test perseverative errors, .61 for sequential matching memory task errors, and .59 for necker cube reversals, indicating that all three variables are related to the differences among groups in the predicted direction.

In sum, the results of the analysis indicate that alcoholics and antisocial psychiatric patients occupy essentially the same dimensional space generated by the discriminant function analysis, which is different from the space occupied by nonantisocial psychiatric patients and college students.

A second discriminant function analysis was undertaken in which the alcoholic group was subdivided into an older and a younger group. The older group consisted of those alcoholics who were age 40 or older, and the younger group of those who were under age 40. This analysis was undertaken in order to determine whether the pattern of cognitive-perceptual deficit identified in the alcoholic group as a whole was restricted to the older chronic alcoholics - as appears to be the case for many neuropsychological measures (e.g. Goldman, 1983) - or whether the pattern is present in younger alcoholics as well, in particular, in those alcoholics who are closer in age to the clinical groups used in the previous study.

Some of the characteristics of the two alcoholic groups are presented in Table 2. The older group contains 23 subjects and the younger group 13 subjects. The mean age of the older group is 52 years whereas the mean age of the younger group is 33.5 years. Not indicated in the Table is their estimated chronicity of alcohol abuse,

which naturally differs between the two groups. For the younger group the mean is 11 years ($SD = 6.3$), whereas for the older group the mean is 26.2 years ($SD = 9.3$).

The results of the discriminant function analysis in which the alcoholic group is divided by age are depicted in Figure 2. Again, the overall difference among groups is significant, this time at $p < .005$ (Wilks' Lambda = .671; Approximate $F(12, 223) = 3.019$). F-tests (computed from the Mahalanobis distance) between pairs of groups indicate that the younger group of alcoholics - group 5 - differs significantly from both psychiatric controls - group 2 - and college students - group 3 - ($F(3, 84) = 4.01$, $p < .025$; and $F(3, 84) = 4.33$, $p < .01$, respectively); yet the younger alcoholics do not differ significantly from either the antisocial group - group 1 - or the older alcoholics - group 4 - ($F(3, 84) = .51$; $F(3, 84) = .73$, respectively). Thus, the results indicate that the pattern of cognitive-perceptual deficit in the alcoholic group as a whole is not restricted to the older individuals. In fact, it appears that, if anything, the younger alcoholics might be slightly more impaired on the combination of three measures than the older alcoholics, for the older alcoholics by themselves are only marginally significantly different from the psychiatric control group at $p < .10$ ($F(3, 84) = 2.58$).

Correlations between the first canonical variable, which accounted for 94% of the total dispersion, and each of the discriminator variables were computed, and again the results indicated that all 3 discriminator variables are related to the differences among groups in the predicted direction (the correlations were .73 for

Wisconsin Card Sorting Test perseverative errors, .65 for sequential matching memory task errors, and .57 for Necker Cube reversals).

CONCLUSIONS

In conclusion, these results seem to support the hypothesis that antisocial psychiatric patients and alcoholics are characterized by similar frontal-type deficits, at least as represented by the three cognitive-perceptual measures utilized here. Of course, from the cross-sectional design it cannot be determined whether these deficits in alcoholics are antecedents or consequents of drinking. However, the finding that younger alcoholics have at least the same degree of deficit as the older alcoholics on these particular measures appears consistent with the possibility that they are antecedent. By contrast, other deficits that have been found among only older alcoholics (e.g., Goldman et al., 1983) are perhaps more likely to represent the consequents of drinking.

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Table 1. Characteristics of the Sample (means and SDs).

	<u>ANTISOCIAL/ PSYCHOPATHIC n = 18</u>	<u>PSYCHIATRIC CONTROLS n = 20</u>	<u>COLLEGE STUDENTS n = 18</u>	<u>ALCOHOLICS n = 36</u>
Age	27.1 (7.8)	27.6 (8.1)	-	45.3 (12.1)
Education	12.1 (.83)	12.4 (.94)	-	12.1 (2.3)
Total RDC criteria(APD)	10.9 (3.5)	5.9 (3.1)	-	6.7 (3.9)
Socialization scores	22.7 (4.7)	31.3 (4.6)	35.9 (6.4)	27.7 (7.1)
Percent "psychopathic"	100%	0%	-	35%

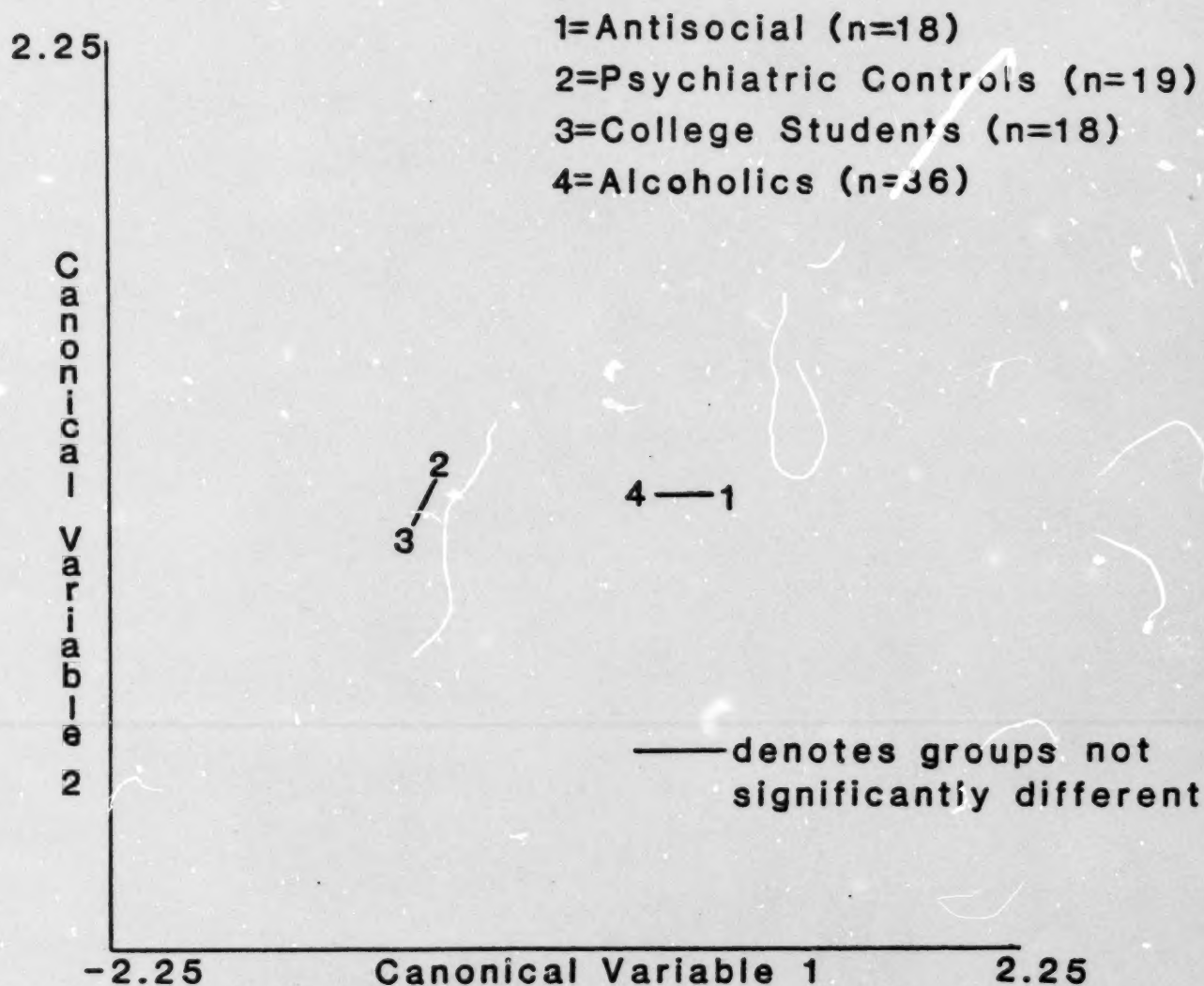


Figure 1. Discriminant function analysis of differences among 4 groups using 3 discriminator variables: (1) WCST perseverative errors, (2) SMMT errors, (3) Necker Cube reversals.

Table 2. Characteristics of alcoholic sample (means and SDs).

	ALCOHOLICS AGE 40 + n = 23	ALCOHOLICS AGE 39 - n = 13
Age	52.0 (9.3)	33.5 (5.9)
Education	11.9 (2.7)	12.3 (1.5)
Total RDC criteria (APD)	6.3 (3.8)	7.4 (4.0)
Socialization scores	27.5 (6.6)	28.1 (8.2)
Percent "psychopathic"	33%	38%
MAST Scores	18.4 (4.3)	17.5 (3.4)
ETOH/year (gallons)	26.5 (17.4)	22.5 (13.7)

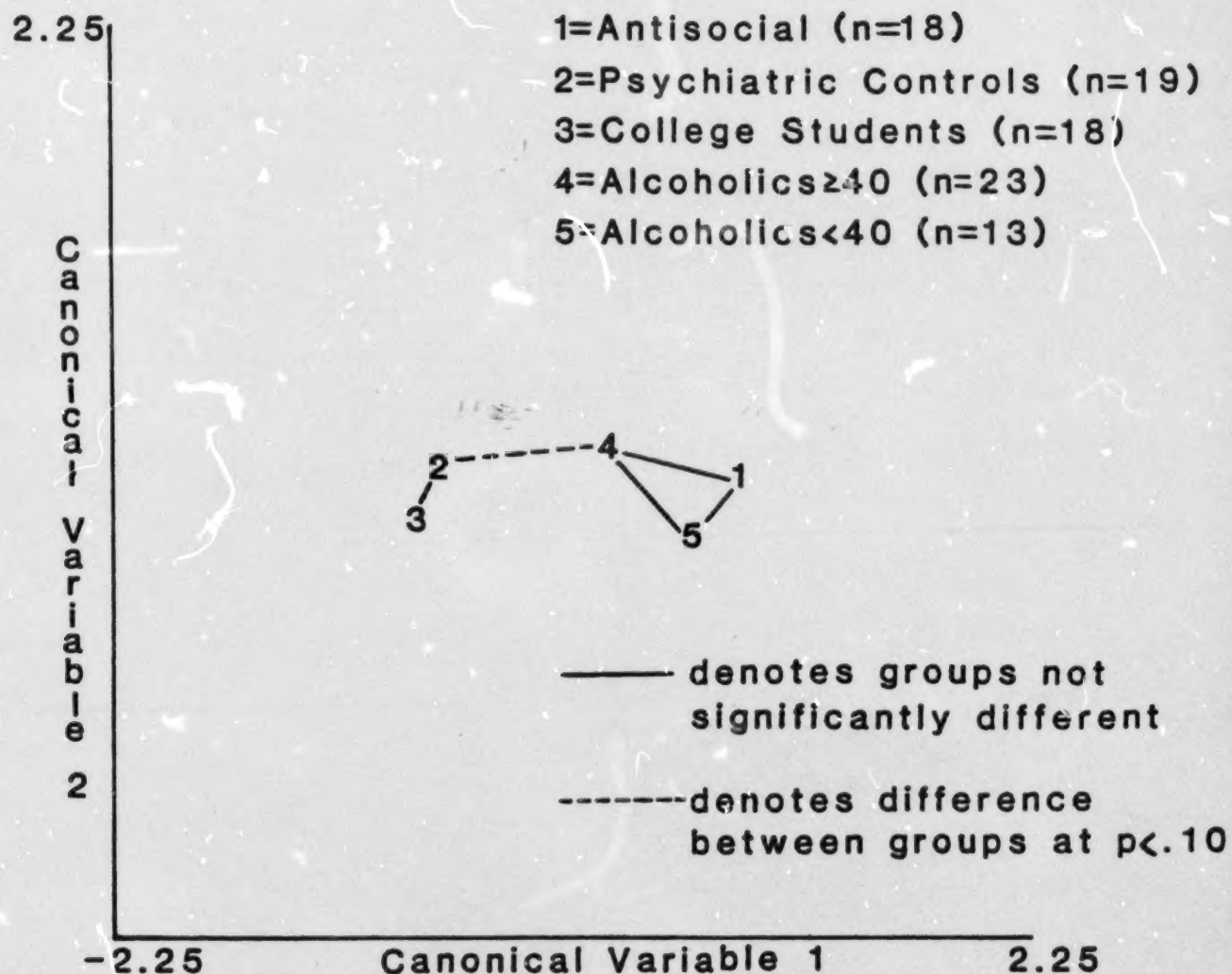


Figure 2. Discriminant function analysis of differences among 5 groups using 3 discriminator variables: (1) WCST perseverative errors, (2) SMMT errors, (3) Necker Cube reversals.